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IS 13767 (1993): Optics - Optical instruments - Contact lenses - Vocabulary and symbols [MHD 5: Ophthalmic Instruments and Appliances]



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(Reaffirmed 1998)

भारतीय मानक

प्रकाशिकी और प्रकाशिक उपकरण — कानटैक्ट लेंस —
शब्दावली और प्रतीक

Indian Standard

OPTICS AND OPTICAL INSTRUMENTS — CONTACT
LENSES — VOCABULARY AND SYMBOLS

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BUREAU OF INDIAN STANDARDS
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NATIONAL FOREWORD

This Indian Standard which is identical with ISO 8320 : 1986 'Optics and optical instruments — Contact lenses — Vocabulary and symbols', issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendations of the Ophthalmic Instruments and Appliances Sectional Committee (MHD 5) and approval of the Medical Equipment and Hospital Planning Division Council.

The text of above mentioned ISO standard has been approved as suitable for publication as Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

- a) Wherever the words 'International Standard' appear, referring to this standard, they should be read as 'Indian Standard'.
- b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

Only the English language text of the International Standard has been retained while adopting it in this Indian Standard.

Indian Standard

OPTICS AND OPTICAL INSTRUMENTS — CONTACT LENSES — VOCABULARY AND SYMBOLS

1 Scope

This International Standard defines terms applicable to contact lenses and to their manufacture, and establishes symbols representing their dimensions. The symbols are given with appropriate definitions in clause 2 and are also shown in the table.

2 Terms and definitions

2.1 General terms

2.1.1 contact lens: A generic term including any lens designed to be worn on the front surface of the eyeball.

2.1.2 contact shell: Appliance similar in form to a contact lens but not designed to correct vision.

2.1.3 corneal lens: Contact lens designed to be worn in its entirety on the cornea.

2.1.4 scleral lens: Contact lens designed to be worn on the cornea and sclera.

2.1.5 cosmetic lens: Contact lens having refractive effect, but specifically designed to change the appearance of the eye.

2.1.6 cosmetic shell: Contact shell having no refractive effect, but specifically designed to change the appearance of the eye.

2.1.7 bi-curve: Surface (front or back) composed of two intersecting zones of different curvatures.

2.1.8 tri-curve: Surface (front or back) composed of three intersecting zones of different curvatures.

2.1.9 multi-curve: Surface (front or back) composed of more than three intersecting zones of different curvatures.

2.1.10 aspheric lens: Lens with at least one surface (front and/or back) having a form generated by the rotation of a curve of continuously varying radius about the lens axis.

2.1.11 toric lens: Lens with front or back central optic zone of toroidal form.

2.1.12 bi-toric lens: Lens having both front and back central optic zones of toroidal form.

2.1.13 peripheral toric lens: Lens with one or more peripheral front or back zones of toroidal form.

2.1.14 optic zone: Zone of a contact lens that has a prescribed optical effect.

2.1.15 central optic zone: Central region of a contact lens that has a prescribed optical effect where there is a peripheral optic zone or zones.

2.1.16 peripheral zone: Region of specified dimensions surrounding the central optic zone.

NOTES

1 These zones are numbered first, second, third, etc., beginning with the zone immediately surrounding the central optic zone.

2 The term may be qualified, for example "back peripheral zone", or "front peripheral zone".

2.1.17 peripheral optic zone: Peripheral zone designed to have a prescribed optical effect.

NOTE — The numbering of the zones is as described in note 1 to 2.1.16.

2.1.18 optic zone diameter: Diameter of a specified optic zone, measured to the surrounding junction. If the latter is not circular, the major and minor diameters define the size.

NOTE — The term may be qualified, for example "back central optic zone diameter".

2.1.19 back central optic radius, r_0 : Radius of curvature of the back central optic zone.

2.1.20 back peripheral radius, $r_1, r_2, \dots$: Radius of curvature of a back peripheral zone.

NOTE — These zones are numbered first, second, third, etc., beginning with the zone immediately surrounding the central optic zone.

2.1.21 optical decentration: Positioning of the optical centre at a point other than the geometrical centre of the optic or central optic zone.

2.1.22 displacement of optic (for lenses other than scleral): Displacement of the central optic zone relative to the lens periphery.

NOTE — For scleral lenses, see 2.2.14.

2.1.23 overall sagitta: The distance along the lens axis from the back vertex to the total diameter.

2.1.24 transition: Junction modified to smooth the change between adjacent curvatures.

2.1.25 blending: Process of forming a transition.

2.1.26 liquid lens: Lens formed by the liquid between the back optic surface of the contact lens and the cornea.

NOTE — This liquid lens is usually formed by tears.

2.1.27 front vertex power, F_v : Reciprocal of the focal length, in metres, of the optic zone(s) of the lens, measured in air, or calculated for the lens, from the front vertex of the lens.

2.1.28 back vertex power, F'_v : Reciprocal of the focal length, in metres, of the optic zone(s) of the lens, measured in air, or calculated for the lens, from the back vertex of the lens.

2.1.29 total diameter, ϕ_T : Maximum external dimension(s) of the finished lens or shell.

NOTE — In non-circular shapes, the long axis is first determined as the maximum dimension. The short axis is the perpendicular distance between tangents to the lens periphery on each side of, and parallel to, the long axis.

2.1.30 lenticular lens: Lens having a front central optic zone made smaller than the total diameter.

2.1.31 carrier: That part of a lenticular lens surrounding the front central optic zone.

2.1.32 cone angle, α : Angle of any conical revolution surface, i.e. the angle between the generating line and its axis of revolution.

2.1.33 edge: That part of a contact lens joining the front and back surfaces.

2.1.34 edge form: Profile of the edge in a plane containing the lens axis.

2.1.35 geometrical centre thickness, t_c : Thickness of the lens or shell at its geometrical centre.

2.1.36 optical centre thickness: Thickness of the lens at its optical centre.

2.1.37 carrier junction thickness, t_{suffix} : Thickness of the lens measured normal to the back surface at the junction of the front optic and carrier.

2.1.38 peripheral junction thickness: Thickness of the lens measured parallel to the lens axis (see line XX in figure 1) at a specified junction.

2.1.39 radial edge thickness, t_e : Thickness of the lens measured normal to the front surface at a specified point near the edge.

2.1.40 fenestration: Prescribed hole.

2.1.41 channel: Prescribed groove.

2.1.42 ballast: Asymmetrical distribution of mass.

2.1.43 prism ballast: Ballast incorporated by means of a prism at a specified position.

2.1.44 truncation: Prescribed removal of a peripheral part of a lens.

2.1.45 axial edge lift, l_a : Distance between a point on the back surface of a lens at a specified diameter and the continuation of the back central optic zone, measured parallel to the lens axis.

2.1.46 radial edge lift, l_r : Distance between a point on the back surface of a lens at a specified diameter and the continuation of the back central optic zone, measured along a radius of curvature of the latter.

2.2 Scleral lenses and shells

2.2.1 scleral zone: That zone of a scleral lens (or shell) designed to lie in front of the sclera.

2.2.2 scleral shell: Contact shell with a scleral zone.

2.2.3 impression lens: Scleral lens the back scleral surface of which has been produced by moulding from a cast of the eye.

2.2.4 impression shell: Scleral shell made from a cast of the eye.

2.2.5 impression tray: Form of shell used to hold impression material in contact with the eye.

2.2.6 vertex clearance: Distance from the front surface of the cast to the back surface of the shell, measured at the geometric centre of the back optic zone.

2.2.7 preformed scleral lens: Scleral lens, not an impression lens, the back surface of which is of a predetermined form.

2.2.8 primary optic diameter: Longest optic diameter of a lens in which the junction of the back central optic and back central scleral surfaces is not circular (for example dimension RS in figures 3 and 4).

2.2.9 primary optic plane: Plane perpendicular to the lens axis and containing the primary optic diameter.

2.2.10 primary sagitta: Distance along the lens axis from the back optic surface to the primary optic plane (A_2T in figures 3 and 4).

2.2.11 back scleral size: Maximum internal dimension (see figure 2) of the back scleral surface before the sharp edge has been rounded.

2.2.12 scleral thickness: Thickness of the scleral zone measured normal to the front scleral surface at any specified point.

2.2.13 scleral chord: In a specified meridian, the distance from the optic-scleral junction to the junction of the back scleral surface with the edge (see dimensions EF and GH in figure 5).

2.2.14 displacement of optic: Half the difference between the two maximum and minimum scleral chords (see figure 5).

2.3 Bifocal, multi-focal and progressive power lenses

2.3.1 concentric lens: Lens having areas of different power, each centred at, or near to, the geometrical centre of the lens.

2.3.2 solid segment: Bifocal or multi-focal lens formed from one material.

2.3.3 fused segment lens: Bifocal or multi-focal lens made from materials of different refractive indices.

2.3.4 progressive power lens: Lens designed to provide correction for more than one viewing range in which the power changes continuously.

2.3.5 bifocal segment height: Distance, in millimetres, from the bottom edge of a corneal lens or from the bottom edge of the optic zone of a scleral lens, to the centre of the top edge of the bifocal segment.

NOTE — This definition is not applicable to concentric bifocal lenses.

2.4 Contact lens manufacture and materials

2.4.1 water content: The proportion by mass of water retained within a lens under specified conditions.

2.4.2 wettability: A property of the contact lens surface as defined by the contact angle and measured under specified conditions.

2.4.3 oxygen permeability, Dk : The rate of oxygen flow under specified conditions through the unit area of contact lens material of unit thickness when subjected to unit pressure difference:

$$Dk \approx \frac{\text{amount of oxygen} \times \text{thickness}}{\text{area} \times \text{time} \times \text{pressure difference}}$$

2.4.4 oxygen transmissibility, $\frac{Dk}{t}$ ¹⁾: The value for oxygen permeability divided by the thickness of the measured sample under specified conditions.

2.4.5 oxygen transmission rate: The amount of oxygen, per unit of time, which diffuses through a contact lens under specified conditions, when subjected to unit pressure difference.

2.4.6 moulded lens: Contact lens manufactured primarily in a mould.

2.4.7 lathe cut lens; turned lens: Contact lens primarily manufactured by removal of material.

2.4.8 hard lens; rigid lens: Contact lens which, in its final form and under normal conditions, retains its form without support.

2.4.9 gas permeable hard [rigid] lens: Hard lens which allows passage through the material of all, or a substantial part, of the oxygen required for corneal metabolism.

2.4.10 soft lens: Contact lens which, in its final form, requires support to maintain its form.

2.4.11 hydrogel lens: Soft lens containing water.

2.4.12 hydrophilic lens: Lens which requires a quantity of water to obtain its functional form and properties.

1) At present, oxygen transmissibility is usually represented as $\frac{Dk}{L}$ in English and as $\frac{Dk}{e}$ in French.

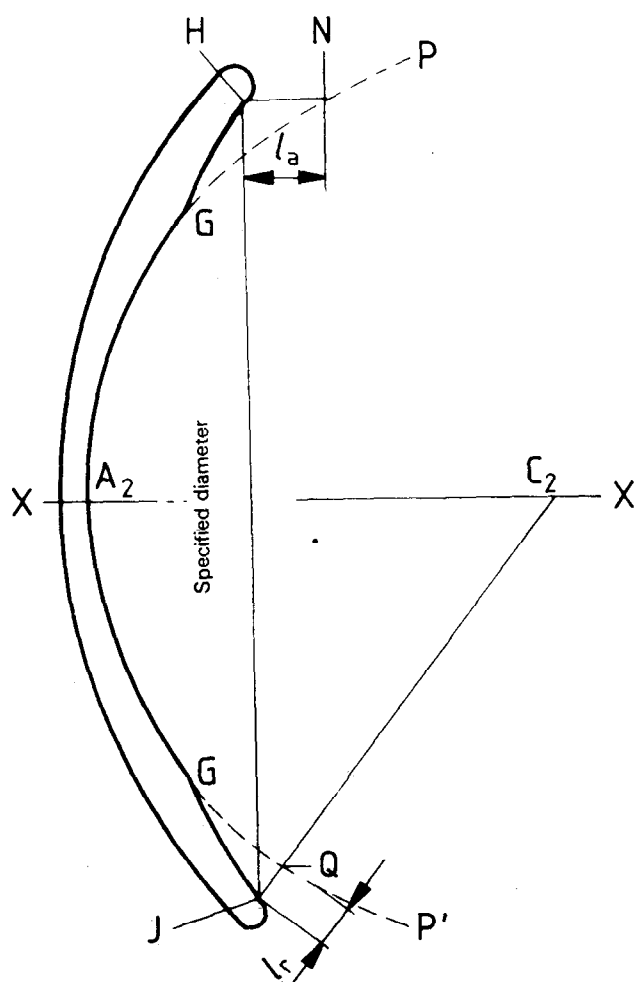
Table — Symbols for dimensions

Dimensions	Symbol	Reference to text
Back optic radius Back central optic radius	r_0	2.1.19
Back peripheral radius Back peripheral optic radius	$r_1, r_2, \dots$	2.1.20
Back optic diameter Back central optic diameter	ϕ_0	
Back peripheral diameters Back peripheral optic diameters	$\phi_1, \phi_2, \dots$	
Total diameter	ϕ_T	2.1.29
Front central optic radius	r_{a0}	
Front peripheral radii	$r_{a1}, r_{a2}, \dots$	
Front central optic diameter	ϕ_{a0}	
Front peripheral diameters	$\phi_{a1}, \phi_{a2}, \dots$	
Geometrical centre thickness	$t_c^{1)}$	2.1.35
Carrier junction thickness	t_{suffix} (subscript to indicate the junction concerned, for example t_{a0}) ²⁾	2.1.37
Radial edge thickness	$t_e^{3)}$	2.1.39
Cone angle	α	2.1.32
Axial edge lift	l_a	2.1.45
Radial edge lift	l_r	2.1.46
Front vertex power	F_v	2.1.27
Back vertex power	F'_v	2.1.28

1) The symbol e_c is used widely in France.

2) The symbol e is used widely in France.

3) The symbol e_b is used widely in France.



- XX Lens axis
A₂ Vertex of back central optic zone
C₂ Centre of curvature of back central optic zone
GP, G'P' Continuation of back central optic zone
H, J Points on back surface of lens at the specified diameter
N Point on GP at the same distance from XX as H
Q Intersection of JC₂ with G'P'
l_a Axial edge lift (l_a = HN)
l_r Radial edge lift (l_r = JQ)

Figure 1 — Axial edge lift and radial edge lift.

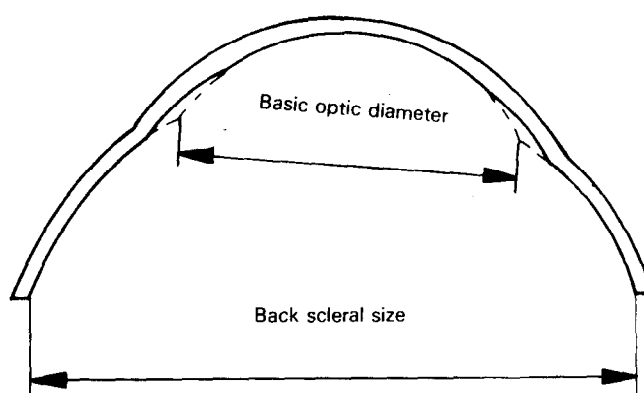
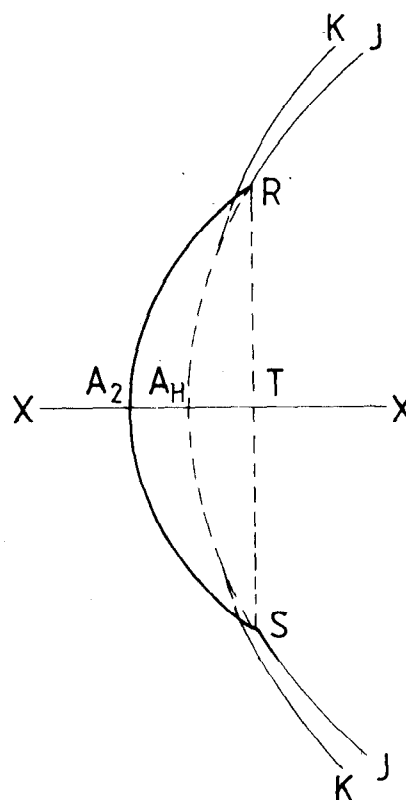
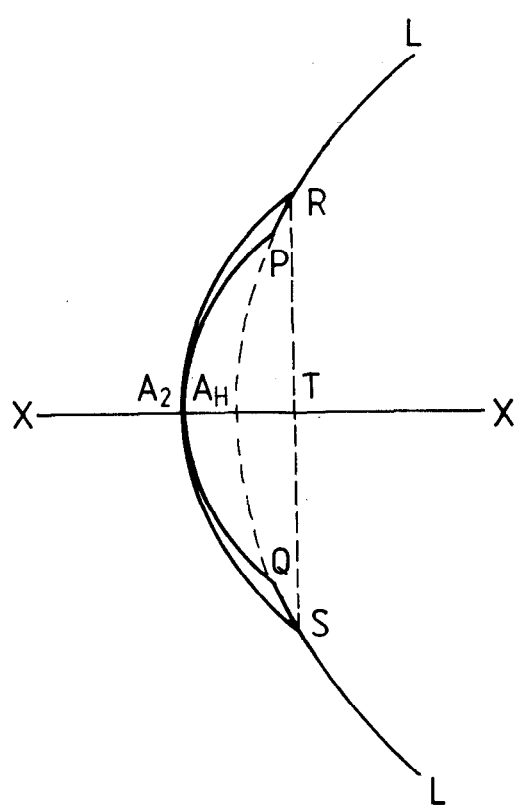


Figure 2 — Basic optic diameter and back scleral size of scleral lens



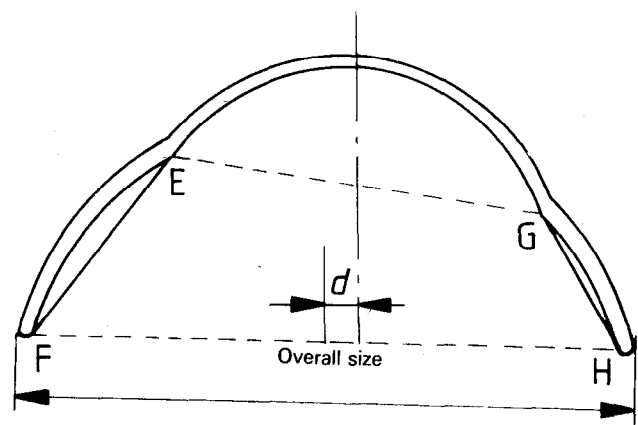
- XX Lens axis
A₂ Back vertex of optic zone
A_H (Virtual) vertex of scleral surface
JJ Section in steeper principal meridian of toroidal surface
KK Section in shallower principal meridian of toroidal surface
RS Primary optic diameter
A₂T Primary sagitta

Figure 3 — Spherical optic with toroidal scleral



- XX Lens axis.
- A₂ Back vertex of optic zone
- A_H (Virtual) vertex of scleral surface
face sclérale
- RA₂S Section in shallower principal meridian of optic surface
- PA₂Q Section in steeper principal meridian of optic surface
- LL Scleral surface
- RS Primary optic diameter
- A₂T Primary sagitta.

Figure 4 — Toroidal optic with spherical scleral



EF, GH Scleral chords
NOTE — Displacement of optic.

$$d = \frac{(EF - GH)}{2}$$

Figure 5 — Dimensions of edged scleral lens

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